

Practice Exam 1

Section I



Time: 1 hour and 30 minutes; number of questions: 40; percentage of total grade: 50.

Directions: Solve each of the following problems. Decide which is the best of the choices given and answer in the appropriate place on the answer sheet. No credit will be given for anything written on the exam. Do not spend too much time on any one problem.

1. A poll was conducted in the San Francisco Bay Area after the San Francisco Giants lost the World Series to the Anaheim Angels about whether the team should get rid of a pitcher who lost two games during the series. Five hundred twenty five adults were interviewed by telephone, and 55% of those responding indicated that the Giants should get rid of the pitcher. It was reported that the survey had a margin of error of 3.5%. Which of the following best describes what is meant by a 3.5% margin of error?
 - a. About 3.5% of the respondents were not Giants fans, and their opinions had to be discarded.
 - b. It's likely that the true percentage that favor getting rid of the pitcher is between 51.5% and 58.5%
 - c. About 3.5% of those contacted refused to answer the question.
 - d. About 3.5% of those contacted said they had no opinion on the matter.
 - e. About 3.5% thought their answer was in error and are likely to change their mind.
2. In a highly academic suburban school system, 45% of the girls and 40% of the boys take advanced placement classes. There are 2200 girls

and 2100 boys enrolled in the high schools of the district. What is the expected number of students who take advanced placement courses in a random sample of 150 students?

- a. 128
 - b. 64
 - c. 78
 - d. 90
 - e. 75
3. One of the values in a normal distribution is 43 and its z score is 1.65. If the mean of the distribution is 40, what is the standard deviation of the distribution?
- a. 3
 - b. -1.82
 - c. .55
 - d. 1.82
 - e. $-.55$
4. Two plans are being considered for determining resistance to fading of a certain type of paint. Some 1500 homes of 9500 homes in a large city are known to have been painted with the paint in question. The plans are:
- Plan A: (i) Random sample 100 homes from all the homes in the city.
- (ii) Record the amount of fade over a 2-year period.
- (iii) Generate a confidence interval for the average amount of fade for all 1500 homes with the paint in question.
- Plan B: (i) Random sample 100 homes from the 1500 homes with the paint in question.
- (ii) Record the amount of fade over a 2-year period.
- (iii) Generate a confidence interval for the average amount of fade for all 1500 homes with the paint in question.
- a. Choose Plan A over Plan B
 - b. Either plan is good—the confidence intervals will be the same.
 - c. Neither plan is good—neither addresses the concerns of the study.
 - d. Choose Plan B over Plan A
 - e. You can't make a choice—there isn't enough information given to evaluate the two plans.
5. Which of the following is *not* a property of the sample standard deviation (s)?
- a. sensitive to the variability of the distribution
 - b. independent of the mean
 - c. resistant to extreme data values
 - d. independent of the median
 - e. all of the above are properties of s

6. The weights of professional football players are approximately normally distributed with a mean of 245 lbs. with a standard deviation of 20 lbs. If Thor is at the 80th percentile in weight for football players, which of the following is closest to his weight in pounds?
- 265
 - 255
 - 252
 - 270
 - 262
7. In a famous study from the late 1920s, the Western Electric Company wanted to study the effect of lighting on productivity. They discovered that worker productivity increased with each change of lighting, whether the lighting was increased or decreased. The workers were aware that a study was in progress. What is the most likely cause of this phenomena? (This effect is known as the Hawthorne Effect.)
- Response bias
 - Absence of a control group
 - Lack of randomization
 - Sampling variability
 - Undercoverage
8. Chris is picked up by the police for stealing hubcaps, but claims that he is innocent, and it is a case of mistaken identity. He goes on trial, and the judge somberly informs the jury that Chris is innocent until proved guilty. That is, they should find him guilty only if there is overwhelming evidence to reject the assumption of innocence. What risk is involved in the jury making a type-I error?
- He is guilty, but the jury finds him innocent, and he goes free.
 - He is innocent, and they find him innocent, and he goes free.
 - He is innocent, but the jury finds him guilty, and he goes to jail.
 - He is guilty, and they find him guilty, and he goes to jail.
 - He is guilty, and they correctly reject the assumption of innocence.
9. Given $P(A) = .4$, $P(B) = .3$, $P(B|A) = .2$. What are $P(A \text{ and } B)$ and $P(A \text{ or } B)$?
- $P(A \text{ and } B) = .12$, $P(A \text{ or } B) = .58$
 - $P(A \text{ and } B) = .08$, $P(A \text{ or } B) = .62$
 - $P(A \text{ and } B) = .12$, $P(A \text{ or } B) = .62$
 - $P(A \text{ and } B) = .08$, $P(A \text{ or } B) = .58$
 - $P(A \text{ and } B) = .08$, $P(A \text{ or } B) = .70$

10. As part of a training program to improve sales efficiency, 10 trainees were given a pretest and a post-test on the sales skills emphasized in the program. The results were as follows:

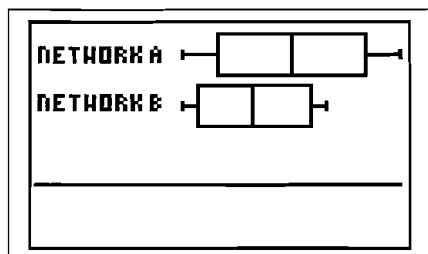
Trainee	Pretest Score	Post-test Score
A	15	17
B	17	17
C	18	21
D	12	16
E	19	18
F	21	21
G	16	19
H	15	19
I	14	15
J	18	20

What number of degrees of freedom are involved with the appropriate t test for determining if there is a real difference between the mean pre- and post-test scores?

- a. 9
 - b. 10
 - c. 18
 - d. 19
 - e. 20
11. A researcher is interested in establishing a cause-and-effect relationship between exercise level and percentage of body fat. Which of the following should she use?
- a. A survey with a stratified random sample
 - b. An observational study
 - c. A census
 - d. A controlled experiment
 - e. A longitudinal study
12. You are going to conduct an experiment to determine which of four different brands of cat food promotes growth best in kittens ages 4 months to 1 year. You are concerned that the effect might vary by the breed of the cat, so you divide the cats into three different categories by breed. This gives you eight kittens in each category. You randomly assign two of the kittens in each category to one of the four foods. The design of this study is best described as:
- a. Randomized block, blocked by breed of cat and type of dog food
 - b. Randomized block, blocked by type of cat food
 - c. Matched pairs where each two cats are considered a pair

- d. A controlled design in which the various breed of cats are the controls
- e. Randomized block, blocked by breed of cat

13.



The boxplots above compare the television ratings for two competing networks. What conclusion(s) can you draw from the boxplots?

- I. Network A has more shows than Network B
 - II. Network A has a greater range of ratings than Network B
 - III. Network A is higher rated than Network B
- a. I and II only
 - b. II and III only
 - c. I and III only
 - d. I, II, and III
 - e. III only
14. A least-squares regression line for predicting performance on a college entrance exam based on high school grade point average (GPA) is determined to be $Score = 273.5 + 91.2 (GPA)$. One student in the study had a high school GPA of 3.0 and a score of 510. What is the residual score for this student?
- a. 26.2
 - b. 43.9
 - c. -37.1
 - d. -26.2
 - e. 37.1
15. The following table gives the probabilities of various outcomes for a gambling game.

Outcome	Lose \$1	Win \$1	Win \$2
Probability	.6	.25	.15

What is the player's expected return on a bet of \$1?

- a. \$.05
- b. -\$.60
- c. -\$.05

- d. $-\$.10$
 - e. You can't answer this question because this isn't a complete probability distribution.
16. A kennel club argues that 50% of dog owners in their area own Golden Retrievers, 40% own Shepherds of one kind or another, and 10% own a variety of other breeds. A random sample of 50 dogs from the area turns up the data in the following table:

Golden Retriever	Shepherd	Other
27	22	1

What is the value of the χ^2 statistic for the goodness-of-fit test on these data?

- a. 3.56
 - b. 2.12
 - c. 4.31
 - d. 3.02
 - e. 2.78
17. A poll is taken to measure the proportion of voters who plan to vote for a former actor for Governor. A 95% confidence interval is constructed based on a sample survey. The interval constructed is $<.35, .42>$. Which of the following best describes how to interpret this interval?
- a. The probability is .95 that about 40% of the voters will vote for the former actor.
 - b. The probability is .95 that between 35% and 42% of the population will vote for the former actor.
 - c. At least 35%, but not more than 42%, of the voters will vote for the former actor.
 - d. The sample result is likely to be in the interval $<.35, .42>$
 - e. It is likely that the true proportion of voters who will vote for the former actor is between 35% and 42%
18. Harvey found out that his z score on a college readiness test, compared to others who took the same test was 1.25. Which of the following best describes how you might interpret this value?
- a. Harvey's score was 125.
 - b. Harvey's score was 1.25 standard deviations above the mean of all people taking the test.
 - c. Only 1.25% of the people taking the test had scores higher than Harvey.

- d. Harvey scored 1.25 point above the mean of all people taking the test.
 - e. Harvey's score was 1.25 times the mean score of all people taking the test.
19. You want to compare the number of home runs hit in the American League to the number of home runs hit in the National League each year over the past 25 years. Which of the following is likely to be most useful in graphically demonstrating the differences between the two leagues?
- a. Parallel boxplots
 - b. Scatterplot of American League vs. National League
 - c. Back-to-back stemplots
 - d. Side-by-side histograms
 - e. Cumulative frequency plots

Questions 20 and 21 refer to the following information:

At a local community college, 90% of students take English. 80% of those who don't take English take art courses, while only 50% of those who do take English take art.

20. What is the probability that a student takes art?
- a. .80
 - b. .53
 - c. .50
 - d. 1.3
 - e. .45
21. What is the probability that a student who takes art doesn't take English?
- a. .08
 - b. .10
 - c. .8
 - d. .85
 - e. .15
22. A teacher was recording grades for her class of 32 AP Statistics students. She accidentally recorded one score much too high (she put a "1" in front, so the score was 192 instead of 92). The corrected score was still greater any other grade in the class. Which of the following sample statistics remained the same after the correction was made?
- a. Mean
 - b. Standard Deviation
 - c. Range
 - d. Variance
 - e. Interquartile range

23. A study of 15 people ages 5 through 77 was conducted to determine the amount of leisure time people of various ages have. The results are shown in the following table.

Time = 7.85 + 0.0094 Age				
Predictor	Coef	St Dev	<i>t</i> ratio	<i>P</i>
Constant	7.845	3.032	2.59	.023
Age	0.00935	0.07015	0.13	.896
s = 5.628 R-sq = 0.1% R-sq(adj) = 0.0%				

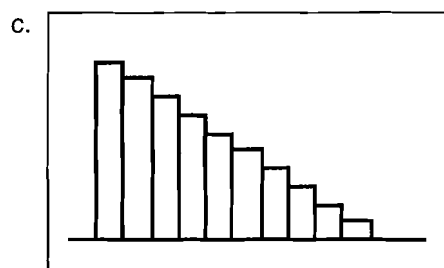
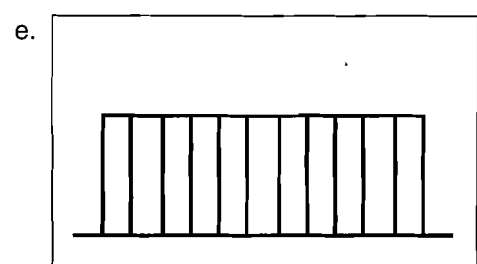
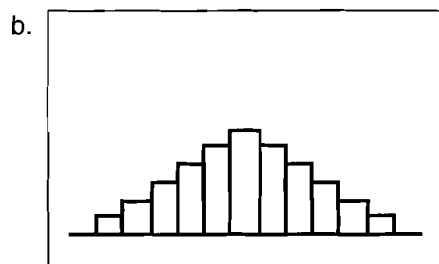
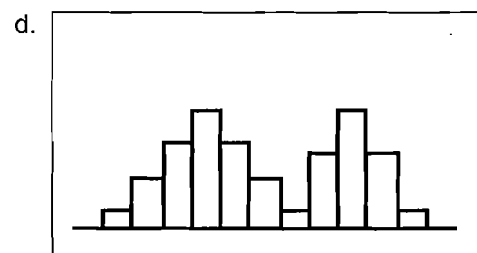
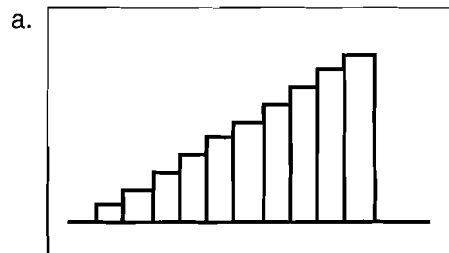
- Which of the following is the 99% confidence interval for the true slope of the regression line?
- .00935 ± 3.012(.07015)
 - .00935 ± 2.977(5.628)
 - 7.845 ± 3.012(.07015)
 - .00935 ± 2.977(.07015)
 - .00935 ± 3.012(5.628)
24. You want to conduct a survey to determine the types of exercise equipment most used by people at your health club. You plan to base your results on a sample of 40 members. Which of the following methods will generate a simple random sample of 40 of the members?
- Mail out surveys to every member and use the first 40 that are returned as your sample.
 - Randomly pick a morning and survey the first 40 people who come in the door that day.
 - Divide the number of members by 40 to get a value k . Choose one of the first k th names on the list using a random number generator. Then choose every k th name on the list after that name.
 - Put each member's name on a slip of paper and randomly select 40 slips.
 - Get the sign-in lists for each day of the week, Monday through Friday. Randomly choose 8 names from each day for the survey.
25. In a large population, 55% of the people get a physical examination at least once every two years. A SRS of 100 people are interviewed and the sample proportion is computed. The mean and standard deviation of the sampling distribution of the sample proportion are
- 55, 4.97
 - .55, .002
 - 55, 2
 - .55, .0497
 - You cannot determine the standard deviation from the information given.

26. In a test of the null hypothesis $H_0: p = .35$, with $\alpha = .01$, against the alternative hypothesis $H_A: p < .35$, a large random sample produces a z score of -2.05 . Based on this, which of the following conclusions can be drawn?
- a. It is likely that $p < .35$
 - b. $p < .35$ only 2% of the time.
 - c. If the z score were positive instead of negative, we would be able to reject the null hypothesis.
 - d. We do not have sufficient evidence to claim that $p < .35$.
 - e. 1% of the time we will reject the alternative hypothesis in error.
27. A wine maker advertises that the mean alcohol content of the wine produced by his winery is 11%. A 95% confidence interval, based on a random sample of 100 bottles of wine yields a confidence interval for the true alcohol content of $<10.5, 10.9>$. Could this interval be used as part of a hypothesis test of the null hypothesis $H_0: p = .11$ vs. the alternative hypothesis $H_A: p \neq .11$ at the .05 level of confidence?
- a. No, you cannot use a confidence interval in a hypothesis test.
 - b. Yes, because .11 is not contained in the 95% confidence interval, a two-sided test at the .05 level of significance would provide good evidence that the true mean content is different from 11%.
 - c. No, because we do not know that the distribution is approximately normally distributed.
 - d. Yes, because .11 is not contained in the 95% confidence interval, a two-sided test at the .05 level of significance would fail to reject the null hypothesis.
 - e. No, confidence intervals can only be used in one-sided confidence intervals.
28. The weights of a large group of college football players is approximately normally distributed. It was determined that 10% of the players weigh less than 154 pounds and 5% weigh more than 213 pounds. What are the mean and standard deviation of the distribution of weights of football players?
- a. 183.5, 19.44
 - b. 185.8, 22.36
 - c. 179.8, 20.17
 - d. 167.3, 18.66
 - e. 170.9, 19.85
29. An advice columnist asks readers to write in about how happy they are in their marriage. The results indicate that 79% of those responding would not marry the same partner if they had it to do all over again. Which of the following statements are true?

- a. It's likely that this result is an accurate reflection of the population.
 - b. It's likely that this result is higher than the true population proportion because persons unhappy in their marriages are most likely to respond.
 - c. It's likely that this result is lower than the true population proportion because persons unhappy in their marriages are unlikely to respond.
 - d. It's likely that the results are not accurate because people tend to lie in voluntary response surveys.
 - e. There is really no way of predicting whether the results are biased or not.
30. A national polling organization wishes to generate a 98% confidence interval for the proportion of voters who will vote for candidate Iam Sleazy in the next election. The poll is to have a margin of error of no more than 3%. What is the minimum sample size needed for this interval?
- a. 6032
 - b. 1508
 - c. 39
 - d. 6033
 - e. 1509
31. In a test of the hypothesis $H_0: p = .7$ against $H_A: p > .7$, the power of the test when $p = .8$ would be greatest for which of the following?
- a. $n = 30, \alpha = .10$
 - b. $n = 30, \alpha = .05$
 - c. $n = 25, \alpha = .10$
 - d. $n = 25, \alpha = .05$
 - e. It cannot be determined with the information given.
32. A school survey of students concerning which band to hire for the next school dance shows 70% of students in favor of hiring The Greasy Slugs. What is the probability that, in a random sample of 200 students, at least 150 will favor hiring The Greasy Slugs?
- a. $\binom{200}{150} (.7)^{150} (.3)^{50}$
 - b. $\binom{200}{150} (.3)^{150} (.7)^{50}$
 - c. $P\left(z > \frac{.75 - .70}{\sqrt{\frac{.7(.3)}{200}}}\right)$
 - d. $P\left(z > \frac{.75 - .70}{\sqrt{\frac{.7(.3)}{150}}}\right)$

$$e. P\left(z > \frac{.70 - .75}{\sqrt{\frac{.7(.3)}{200}}}\right)$$

33. Which of the following describes an experiment but not an observational study?
- A cause-and-effect relationship can be demonstrated.
 - The cost of conducting it is excessive.
 - More advanced statistics are needed for analysis after the data are gathered.
 - By law, the subjects must be informed that they are part of a study.
 - Possible confounding variables are more difficult to control.
34. A least-squares regression line, $\hat{y} = a + bx$ is to be constructed for two variables x and y . As part of the process it is determined that $r = .77$, $\bar{x} = 3.5$, $s_x = .32$, $\bar{y} = 17.8$, and $s_y = 3.6$. What is the slope of the regression line?
- 5.09
 - .068
 - 11.25
 - 8.66
 - 3.92
35. For which one of the following distributions is the mean most likely to be less than the median?



36. In an experiment, the purpose of randomization is to
- equalize blocks in a block design
 - reduce variability by repeating the experiment on many subjects
 - control for variables not under study that might affect the response
 - control for common characteristics
 - make sure each subgroup is fairly represented
37. Which of the following statements is correct?
- The area under a probability density curve for a continuous random variable is 1.
 - A random variable is a numerical outcome of a random event.
 - The sum of the probabilities for a discrete random variable is 1.
- II only
 - I and II
 - I and III
 - II and III
 - I, II, and III
38. A 99% confidence interval for the weights of high school wrestlers is given as $\langle 125, 160 \rangle$. Which of the following statements about this interval is true?
- At least 99% of the weights of high school wrestlers are in the interval $\langle 125, 160 \rangle$.
 - The probability is .99 that the true mean weight of high school wrestlers is in the interval $\langle 125, 160 \rangle$.
 - Ninety-nine percent of all samples of this size will yield a confidence interval of $\langle 125, 160 \rangle$.
 - The procedure used to generate this confidence interval will capture the true mean weight of high school wrestlers 99% of the time.
 - The probability is .99 that a randomly selected wrestler will weight between 125 and 160 pounds.
39. A group of 12 students take both the SAT Math and the SAT Verbal. The least-squares regression line for predicting Verbal Score from Math Score is determined to be $\text{Verbal Score} = 106.56 + .74 (\text{Math Score})$. Furthermore, $s_b = .11$. Determine a 95% confidence interval for the slope of the regression line.
- $.74 \pm .245$
 - $.74 \pm .242$
 - $.74 \pm .240$
 - $.74 \pm .071$
 - $.74 \pm .199$

40. A weight loss clinic claims an average weight loss over 3 months of at least 15 pounds. A random sample of 50 of the clinic's patrons shows a mean weight loss of 14 pounds with a standard deviation of 2.8 pounds. Assuming the distribution of weight losses is approximately normally distributed, what is the appropriate test for this situation, the value of the test statistic, and the associated P value?
- a. z test; $z = -2.53$; $P = .0057$
 - b. t test; $t = -2.53$; $.01 < P < .02$
 - c. z test; $z = 2.53$; $P = .0057$
 - d. t test; $t = 2.53$; $.005 < P < .01$
 - e. z test; $z = 2.53$; $P = .9943$